

A New Genus, *Magniuterina* (Digenea, Lecithodendriidae),
with a Redescription of Adults of *M. leoi*
(Uchida, Uchida & Kamei, 1986) comb. nov. Parasitic in the
Salamander *Onychodactylus japonicus* from Japan

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Abstract A new genus, *Magniuterina* (Digenea, Lecithodendriidae), is created with *Cephalouterina leoi* Uchida, Uchida & Kamei, 1986 as the type and only species. This new genus is distinguished from the most closely related genus *Cephalouterina* Senger & Macy, 1953 by having the genital pore situated ventral and the uterus occupying most of the hindbody. The genus *Cephalouterina* is considered as different from the genus *Cryptotropa* Strand, 1928. Adults including the holotype of *M. leoi* (Uchida et al., 1986) comb. nov. found in the small intestine of *Onychodactylus japonicus* (Houttuyn) (Amphibia, Urodela, Hynobiidae) taken in Fukushima and Nagano Prefectures, Honshu, Japan, are described and illustrated.

Key words: *Magniuterina* gen. nov., *M. leoi* (Uchida et al., 1986) comb. nov., *Cephalouterina*, *Cryptotropa*, Digenea, *Onychodactylus japonicus*, Amphibia, Japan

Introduction

Senger & Macy (1953) described *Cephalouterina dicamptodoni* as a new genus and species from the salamander *Dicamptodon ensatus* taken at Cascade Range, Oregon, USA. Uchida et al. (1986) added a second species of the genus, *C. leoi*, from the salamander *Onychodactylus japonicus* taken at Hinoemata, Fukushima Prefecture, Honshu, Japan.

Some samples of *O. japonicus* collected in Honshu were examined for the monogenean *Pseudopolystoma dendriticum*. Besides the monogenean, some specimens of *C. leoi* also were obtained in this examination. Close examination of the specimens and some related ones led me to propose a new genus for *C. leoi*.

Materials and Methods

The samples of the salamander *Onychodactylus japonicus* (Houttuyn) (Amphibia, Urodela,

Hynobiidae) collected were as follows: 100 adults collected at Hinoemata, Fukushima Prefecture, on 17 June 2003; 1 adult and 1 larva, 7 adults and 4 larvae, and 6 adults collected at Utsukushigahara, Matsumoto, Nagano Prefecture, Honshu, on 23 May 2001, 3 June 2001, and 1 June 2002, respectively; 1 adult and 5 larvae collected at Wada, Nagano Prefecture, on 24 May 2003; 2 adults collected in the Yakeyamasawa River at Takeshi, Nagano Prefecture, on 30 May 2003; and 47 adults and 5 larvae collected in Hinokisawa, a tributary of the Yakeyamasawa River, at Takeshi on 22 June 2003. The salamanders were examined for helminth parasites.

The digenean specimens obtained were fixed with hot 10% neutralized formalin and stained with Mayer's acid hematoxylin; slightly flattened, fixed with AFA, and stained with Heidenhain's iron hematoxylin; or slightly flattened, fixed with 70% ethanol, and stained with Grenacher's alum carmine. These stained specimens were mounted in Canada balsam.

Specimens borrowed for comparison were as follows: the holotype (stained and whole-mounted adult) of *Cephalouterina leoi* Uchida et al., 1986 (Akihiko Uchida's personal collection), found in the small intestine of *O. japonicus* taken at Hinoemata (Uchida et al., 1986); a paratype (stained and whole-mounted adult) of *C. dicamptodoni* Senger & Macy, 1953 (U.S. National Parasite Collection, USNPC No. 047554.00) found in the small intestine of the salamander *Dicamptodon ensatus* (Eschscholtz) (Cryptobranchidae) taken at Cascade Range, Oregon, USA (Senger & Macy, 1953); 1 specimen (serially-sectioned adult) of *Cryptotrema kuretanii* Ozaki, 1926, namely now *Cryptotropa kuretanii* (Ozaki, 1926) Strand, 1928 [Yoshimasa Ozaki's collection deposited in Meguro Parasitological Museum (MPM), Tokyo, MPM Coll. No. 30138] [most presumably found in the small intestine of *Polypedates buergeri* (Schlegel) [= *Buergeria buergeri* (Schlegel)] (Amphibia, Anura, Rhacophoridae) taken in the vicinity of Yasuhara, Kagawa Prefecture, Shikoku, Japan] (Ozaki, 1926); and many unpublished specimens (stained and whole-mounted adults) of *C. kuretanii* collected on Okinawa Island, Okinawa Prefecture, Japan [Hideo Hasegawa's personal collection, now deposited in the National Science Museum, Tokyo (NSMT)]. The last mentioned included: 4 (NSMT-PI 5234) found in the small intestine of *Rhacophorus viridis viridis* (Hallowell) (Rhacophoridae) taken at the upper reaches of the Benoki River at Kunigamison on 16 January 1984; 6 (NSMT-PI 5233) found in the small intestine of *R. viridis viridis* taken at Benoki, Kunigamison, on 24 February 1989; 4 (NSMT-PI 5235) found in the small intestine of *Rana (Hylarana) narina narina* Stejneger (Amphibia, Anura, Ranidae) taken at the upper reaches of the Benoki River at Kunigamison on 15 January 1984 (see Hasegawa & Iwatsuki, 1986); 23 (NSMT-PI 5236) found in the small intestine of *Japalura polygonata polygonata* (Hallowell) (Reptilia, Squamata, Agamidae) taken at Mt. Yonaha-dake, Yonaha, in August 1984; and 29 (NSMT-PI 5237) found in the small intestine of

J. polygonata polygonata taken at Yonaha on 14 September 1984.

Drawings were made with the aid of a drawing tube. Measurements are given in millimeters unless stated otherwise. The specimens studied have been deposited in the NSMT.

Magniuterina gen. nov.

Generic diagnosis. Digenea, Lecithodendriidae. Body elliptical, spinose. Oral sucker subterminal. Prepharynx short. Pharynx elliptical. Esophagus bifurcating anterior to ventral sucker. Intestinal ceca ending at level of ventral sucker. Ventral sucker median, pre-equatorial. Testes symmetrical, separated, post-equatorial. Cirrus pouch clavate, with its posterior end overlapping ventral sucker, including a bipartite seminal vesicle, a small pars prostatica surrounded by prostatic cells, and a protrusible cirrus. Genital atrium small. Genital pore ventral on left side of body, bifurcal, pre-cecal. Ovary postero-dextral to ventral sucker, pre-testicular. Seminal receptacle oval, between ovary and right testis. Laurer's canal present. Ootype median, posterior to ventral sucker. Uterus coiling in most of hindbody; metraterm well developed. Eggs operculate, not embryonated when laid. Vitelline follicles usually confined to field between oral sucker and ovary and left testis. Excretory vesicle Y-shaped, extending anteriorly to ootype. Parasitic in small intestine of salamanders.

Type and only species: *Cephalouterina leoi* Uchida, Uchida & Kamei, 1986.

Etymology. The generic name is derived from a combination of the Latin words *magnus* and *uterinus*, meaning "large" and "uterine", respectively. The gender of the genus is feminine.

Discussion. This new genus is different from the genus *Cephalouterina* in that the genital pore is ventral instead of dorsal (Senger & Macy, 1953) and the uterus coils entirely in the hindbody instead of mostly in the forebody (Senger & Macy, 1953). My re-examination of the paratype of *C. dicamptodoni*, the type species of the genus, has confirmed that the descriptions of

these respects by Senger & Macy (1953) are correct.

The new genus is differentiated from the genus *Cryptotropa* Strand, 1928 [syn. *Cryptotrema* Ozaki, 1926, preoccupied by *Cryptotrema* Gilbert, 1890 (Pisces)] (Lecithodendriidae), whose type species is *Cryptotrema kuretanii* Ozaki, 1926, namely now *Cryptotropa kuretanii* (Ozaki, 1926) Strand, 1928, by the genital pore opening ventrally instead of dorsally (Ozaki, 1926; Hasegawa & Iwatsuki, 1984; this study), the uterus occupying all available space of the hindbody in stead of the space between the bifurcal level and the testis on each side of the body and the inter-testicular space (Ozaki, 1926; Hasegawa & Iwatsuki, 1984; this study), and the vitelline follicles being restricted to the field between the oral sucker and the ovary and left testis instead of the field between the pharyngeal level and the junction of the middle and posterior thirds of the post-testicular region (Ozaki, 1926; Hasegawa & Iwatsuki, 1984; this study).

Khotenovskii (1965) and Prudhoe and Bray (1982) synonymize the genus *Cephalouterina* with the genus *Cryptotropa*. The type species of the latter, *Cryptotrema kuretanii*, was originally described as a new genus and species by Ozaki (1926) from the [small] intestine of the frog *Polypedates buergeri* (= *Buergeria buergeri*) caught in the vicinity of Yasuhara, Kagawa Prefecture, Shikoku, Japan. As Yamaguti (1971) points out, however, the genus *Cephalouterina* (type species *Cephalouterina dicamptodoni*) is distinguished from the genus *Cryptotropa* by the distribution area of the vitelline follicles. The vitelline follicles are distributed mostly in the space between the oral sucker and the testes in the genus *Cephalouterina* (Senger & Macy, 1953; this study), though rarely more posteriorly as far as the mid-level of the post-testicular region on each side of the body (Khotenovskii, 1965). However, they fill most of the body, always entering the post-testicular region, in the genus *Cryptotropa* (Ozaki, 1926; Hasegawa & Iwatsuki, 1984; this study). Moreover, the uterus coils only in the forebody in the genus

Cephalouterina (Senger & Macy, 1953; Khotenovskii, 1965; Anderson et al., 1966; this study) instead of in the space between the bifurcal level and the testes on each side of the body and in the inter-testicular space of the body in the genus *Cryptotropa* (Ozaki, 1926; Hasegawa & Iwatsuki, 1984; this study). The genus *Cephalouterina* is regarded as distinct from the genus *Cryptotropa*.

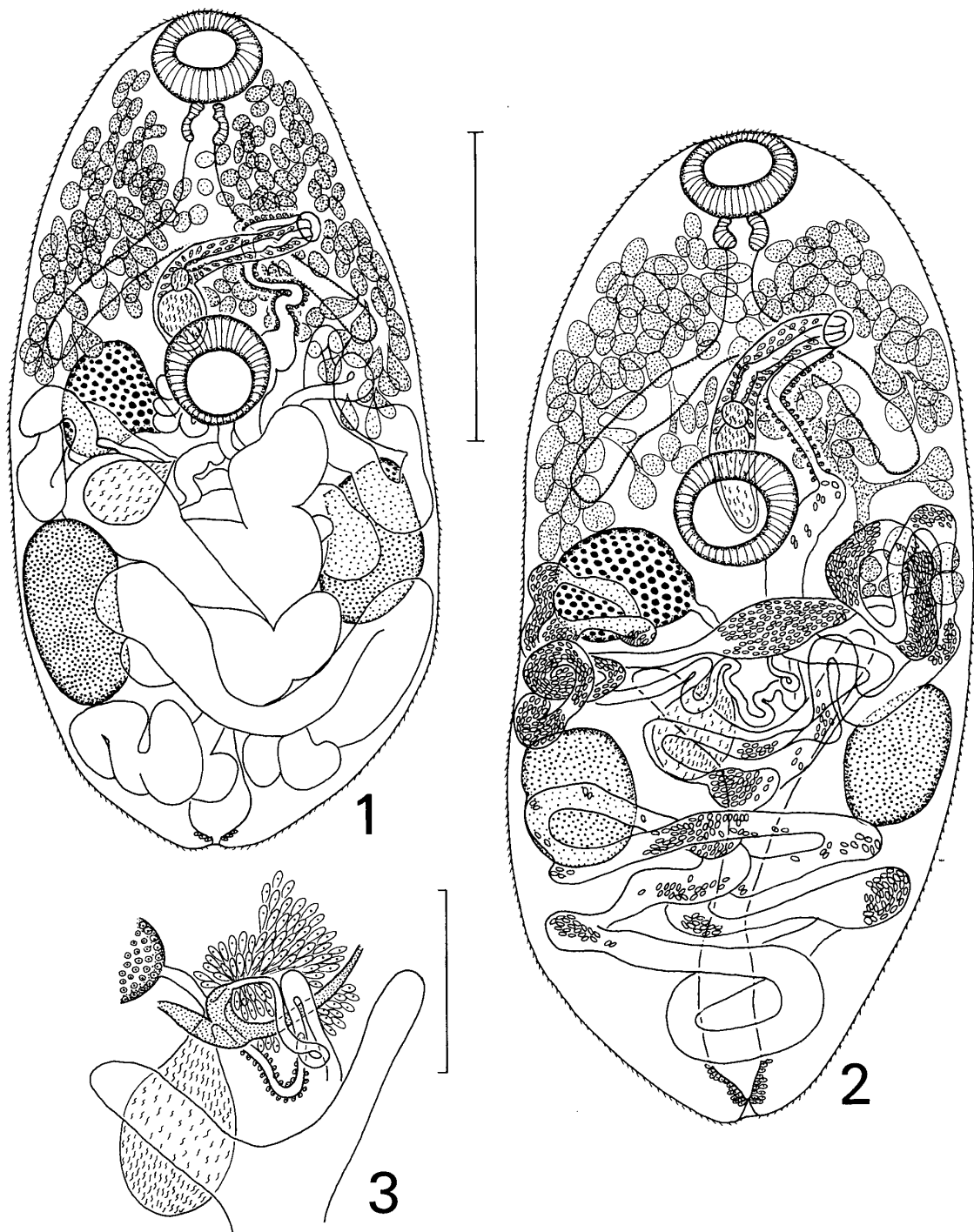
Magiuterina leoi

(Uchida, Uchida & Kamei, 1986) comb. nov.

Syn. *Cephalouterina leoi* Uchida, Uchida & Kamei, 1986

Occurrence. Specimens of this species were found in the small intestine of salamanders: 10 (2 senile and 8 gravid adults) (NSMT-PI 5229) in 1 of the 100 adults from Hinoemata on 17 June 2003; and 9 gravid adults (NSMT-PI 5230) in the larva from Utsukushigahara on 23 May 2001.

Description (Fig. 1). Ten flattened specimens from Hinoemata measured. Body elliptical, spinose, 2.50–3.30 long by 1.20–1.52 wide; forebody 0.94–1.42 long, 36–44% of body length. Numerous gland cells present in lateral field of prececal space on each side of body, possibly each opening at anterior tip of body. Oral sucker depressed round, subterminal, 0.26–0.35 long by 0.35–0.39 wide. Prepharynx very short. Pharynx oval, with 2 lateral, 1 ventral and 1 dorsal muscular processes at its anterior tip, 0.10–0.14 long by 0.14–0.16 wide. Esophagus 0.08–0.27 long, bifurcating about midway between two suckers. Intestinal ceca short, ending at level of ventral sucker. Ventral sucker round, median, slightly posterior to junction of anterior and middle thirds of body, bearing spines especially on peripheral region of internal surface, 0.35–0.39 long by 0.33–0.39 wide; sucker width ratio 1:0.9–1.0. Testes oblong, almost symmetrical, separated, located at about junction of middle and posterior thirds of body, 0.47–0.78 long by 0.16–0.39 wide. Cirrus pouch claviform, curved, ventral to digestive tract, with its posterior end overlapping ventral sucker, 0.51–0.82 long. Seminal vesicle internal, bipartite; anterior portion round; poste-



Figs. 1–3. *Magniuterina leoi* found in the small intestine of *Onychodactylus japonicus*. 1. Gravid adult, new specimen from Hinoemata, flattened, entire body, ventral view. The uterus was so convoluted that its running course could not be traced accurately. Uterine eggs are omitted. 2. Senile adult, holotype from Hinoemata, flattened, entire body, ventral view. The uterus was so convoluted that its running course could not be traced accurately. 3. Ovarian complex, holotype, ventral view. Scale bars: 1 mm in Figs. 1 and 2; 0.5 mm in Fig. 3.

rior elliptical, larger than anterior. Pars prostatica oval, surrounded by prostatic cells. Cirrus (or ejaculatory duct) long, slightly sinuous, protrusible, armed with dense fine spines. Genital atrium small. Genital pore opening ventrally, to left of median line, about bifurcal, anterior to left intestinal cecum. Ovary elliptical or triangular, located postero-dextral to ventral sucker, anterior to right testis, 0.33–0.41 long by 0.20–0.47 wide. Seminal receptacle oval, located between ovary and right testis, 0.25–0.37 by 0.16–0.29 wide. Laurer's canal opening dorsally, surrounded by gland cells. Ootype almost median, posterior to ventral sucker; Mehlis' glands free in parenchyma, developed well. Uterus long, inflated, convoluted in all available space (pre-, inter-, and post-testicular spaces) of hindbody, not reaching posterior extremity of body; sphincter not seen at distal end of uterus; metraterm long, surrounded by gland cells. Eggs operculate, numerous, with a short spine at anopercular pole, 32–36 by 12–14 μm , not embryonated when laid. Vitelline follicles arranged in two lateral groups, usually confined to field between oral sucker and ovary and left testis, sometimes extending only slightly farther beyond left testis, usually confluent across forebody, present mostly dorsal to digestive tract. Excretory vesicle Y-shaped, with a long smooth stem and short arms, extending anteriorly to ootype; excretory pore postero-terminal.

Discussion. The present specimens are identified as *C. leoi*. Uchida et al. (1986) described and illustrated (fig. 1), for this species: the cirrus pouch as dorsal to the digestive tract and extending from "the level of intestinal bifurcation" [but the mid-level of the ventral sucker (fig. 1)] to "that of esophagus"; the genital pore as "dorso-lateral to esophagus" [namely dorsal]; Laurer's canal as undulating; and the right arm of the excretory vesicle as anterior to the seminal receptacle. My re-examination of the holotype of the species (Figs. 2 and 3), apparently a senile adult with eggs only in several parts of the uterus, has shown that: the cirrus pouch is ventral to the digestive tract and extends from the mid-level of the ventral sucker to the bifurcal level; the genital

pore is ventral, to the left of the median line, bifurcal, and anterior to the left intestinal cecum; Laurer's canal is smoothly curved; the uterus coils in much more of the hindbody than figured (fig. 1); and the right arm of the excretory vesicle is ventral to the seminal receptacle.

Magiuterina leoi has been known to occur in *O. japonicus* from Honshu, Japan (Uchida et al., 1986; this study). Its life cycle has not yet been elucidated.

In the present examination of the salamanders, the following helminth parasites were obtained as well. Specimens of the monogenean *Pseudopolystoma dendriticum* (Ozaki, 1948) Yamaguti, 1963 (Polystomatidae) were found in the urinary bladder of salamanders: 1, 1, 1, 1, and 2 each in 5 of the 100 adults from Hinoemata on 17 June 2003; 2 and 1 each in the two adults from Utsukushigahara on 23 May 2001 and 3 June 2001, respectively; and 1, 1, 1, and 3 each in 4 of the 47 adults from Hinokisawa on 22 June 2003. These specimens were sent to Dr. Sophie Bentz and Prof. Claude Combes (Perpignan Universitaire, Perpignan, France) for molecular phylogenetic analysis. Specimens of the digenean *Mesocoelium brevicæcum* Ochi, 1930 (Brachycoelidae) were found in the small intestine of salamanders: 2, 7, and 10 each (NSMT-PI 5232) in 3 of the 100 adults from Hinoemata; and 4 (NSMT-PI 5231) in the adult from the Yakeyamasawa River on 30 May 2003. Specimens of nematodes were found in the stomach, small intestine, large intestine, and rectum of salamanders. They remain to be identified.

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